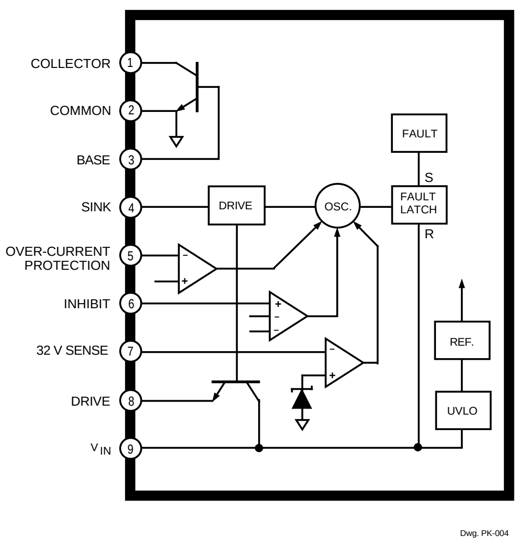
STR-S5703

Data Sheet
28114.1

OFF-LINE SWITCHING REGULATOR – WITH BIPOLAR SWITCHING TRANSISTOR



ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{IN} .... **15 V**

Output Voltage, V_{CEX} .... **500 V**

V_{EBO} .... **7 V**

Continuous Output Current,

I_C .... **6.0 A**

1 ms Single-Pulse Output Current,

I_{CM} .... **12 A**

Sink Current, I_S .... **1.5 A**

Drive Current, I_D .... **-700 mA**

Inhibit Voltage, V_{INH} .... **15 V**

Over-Current Protection Voltage Range,

V_{OCP} .... **±3.5 V**

Insulation Voltage, $V_{WM(RMS)}$ .... **2000 V**

Package Power Diss., P_D .... **See Graph**

Output Junction Temperature, T_J .. **+150°C**

Internal Frame Temperature, T_F ... **+125°C**

Operating Temperature Range,

T_A .... **-20°C to +125°C**

Storage Temperature Range,

T_{stg} .... **-40°C to +125°C**

The STR-S5703 is specifically designed to meet the requirement for increased integration and reliability in off-line quasi-resonant flyback converters with indirect feedback. The device incorporates the primary control and proportional drive circuit with a third-generation high-voltage bipolar switching transistor.

Crucial system parameters such as maximum ON time and OFF time are fixed during manufacture. Local control circuit decoupling and layout are optimized within each device.

Cycle-by-cycle current limiting, under-voltage lock-out with hysteresis, over-voltage protection, and thermal shutdown protect these devices during all normal and overload conditions. Over-voltage protection and thermal shutdown are latched after a short delay. A primary-side error amplifier with reference is included to facilitate regulation from an auxiliary or bias winding of the power transformer. A versatile triple-level inhibit circuit includes the OFF time synchronization required to establish quasi-resonant operation. The inhibit function has also been expanded to initiate operation in stand-by mode in which the power supply delivers a small fraction of the steady-state output power. The dual requirements of dielectric isolation and low transient thermal impedance and steady-state thermal resistance are satisfied in an over-molded single-in-line power package.

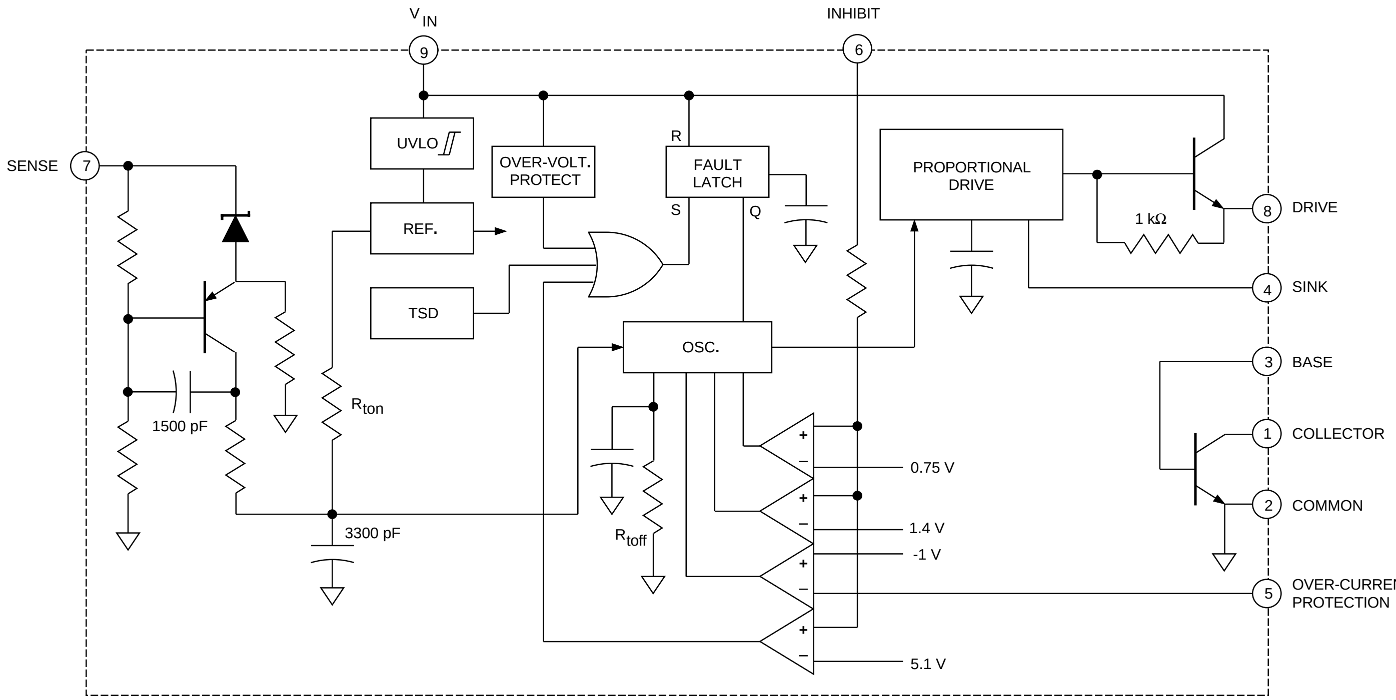
Proven in substantial volumes, this device and its fixed-frequency counterparts represents a significant advance in off-line SMPS reliability growth and integration. Similar devices with increased ratings are the STR-S5707 and STR-S5708.

FEATURES

- Quasi-Resonant Operation for Low EMI and High Efficiency
- Output Power to 140 W
- Low-Power Output Standby Mode
- Indirect Feedback from Auxiliary Winding Reduces External Component Count
- Pulse-by-Pulse Over-Current Protection
- Latched Over-Voltage and Thermal Protection
- Third-Generation Switching Transistor with Proportional Drive
- Maximum ON Time and Off Time Set During Manufacture
- Internal Under-Voltage Lockout with Hysteresis
- Over-Molded SIP with Integral Isolated Heat Spreader

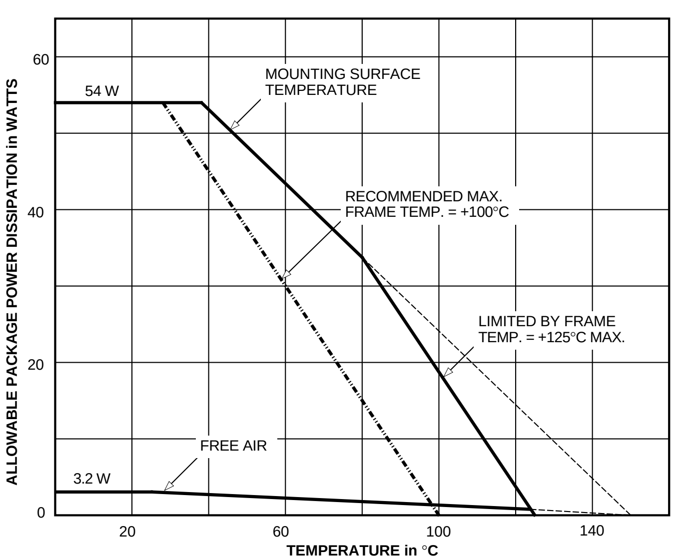
Always order by complete part number: **STR-S5703** .

FUNCTIONAL BLOCK DIAGRAM



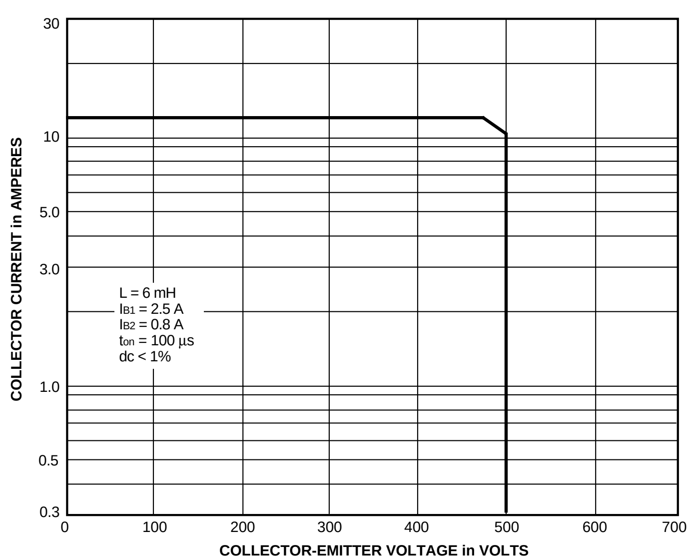
Dwg. FK-001-1

ALLOWABLE PACKAGE POWER DISSIPATION



Dwg. GK-003-2

MAXIMUM SAFE OPERATING AREA



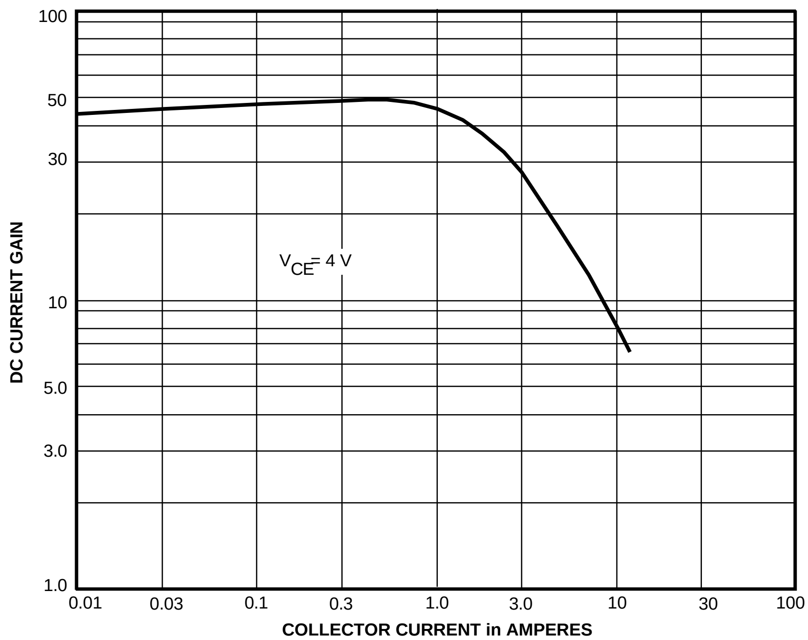
Dwg. GK-002-2A

ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{IN} = 8.5 V, voltage measurements are referenced to Common (pin 2) (unless otherwise noted).

Characteristic	Symbol	Test Conditions	Limits Min.	Limits Typ.	Limits Max.	Units
On-State Voltage	V_{INT}	Turn-on, increasing V_{IN}	7.6	8.0	8.4	V
Under-Voltage Lockout	V_{INQ}	Turn-off, decreasing V_{IN}	4.6	4.9	5.2	V
Over-Voltage Threshold	$V_{OVP(th)}$		9.2	–	10.7	V
Output Leakage Current	I_{CEX}	V_{CE} = 500 V, V_{BE} = -1.5 V	–	–	100	μA
Output Saturation Voltage	$V_{CE(sat)}$	I_C = 2 A, I_B = 400 mA	–	–	400	mV
	$V_{BE(sat)}$	I_C = 2 A, I_B = 400 mA	–	–	1.5	V
DC Current Gain	h_{FE}	V_{CE} = 4 V, I_C = 1 A	23	–	46	–
Maximum ON Time	t_{on}		33	–	41	μs
Minimum OFF Time	t_{off}		45	–	55	μs
Over-Current Threshold	$V_{OCP(th)}$		-0.88	-1.0	-1.12	V
Sense Voltage	V_{SENSE}	I_{SENSE} = 3.2 mA	31.7	32.0	32.3	V
Inhibit Threshold Voltage	$V_{INH(th)}$	Oscillation stops	0.65	0.75	0.85	V
		Oscillation synchronized	–	1.4	2.0	V
		Oscillation stops (fault latch set)	3.2	5.1	5.8	V
Latch Holding Current	I_{INH}	V_{IN} reduced from 10.7 V to 4 V	–	–	500	μA
Latch Reset Voltage	V_Q	$I_{IN} \leq$ 100 μA, V_{IN} reduced from 10.7 V	2.5	3.1	–	V
Ref. Voltage Temp. Coeff.	α_{VZ}	-20°C ≤ T_F ≤ +100°C, I_{IN} = 3.2 mA	–	2.5	–	mV/°C
Supply Current	$I_{IN(ON)}$	Operating	15	–	28	mA
	$I_{IN(OFF)}$		–	–	200	μA
Insulation RMS Voltage	$V_{WM(RMS)}$	All terminals simultaneous reference metal plate against backside	2000	–	–	V
Thermal Shutdown	T_J		125	150	–	°C
Thermal Resistance	$R_{\theta JM}$	Output junction to mounting surface	–	2.0	–	°C/W

NOTES: Negative current is defined as coming out of (sourcing) the specified device terminal.
Typical Data is for design information only.

TYPICAL CHARACTERISTICS



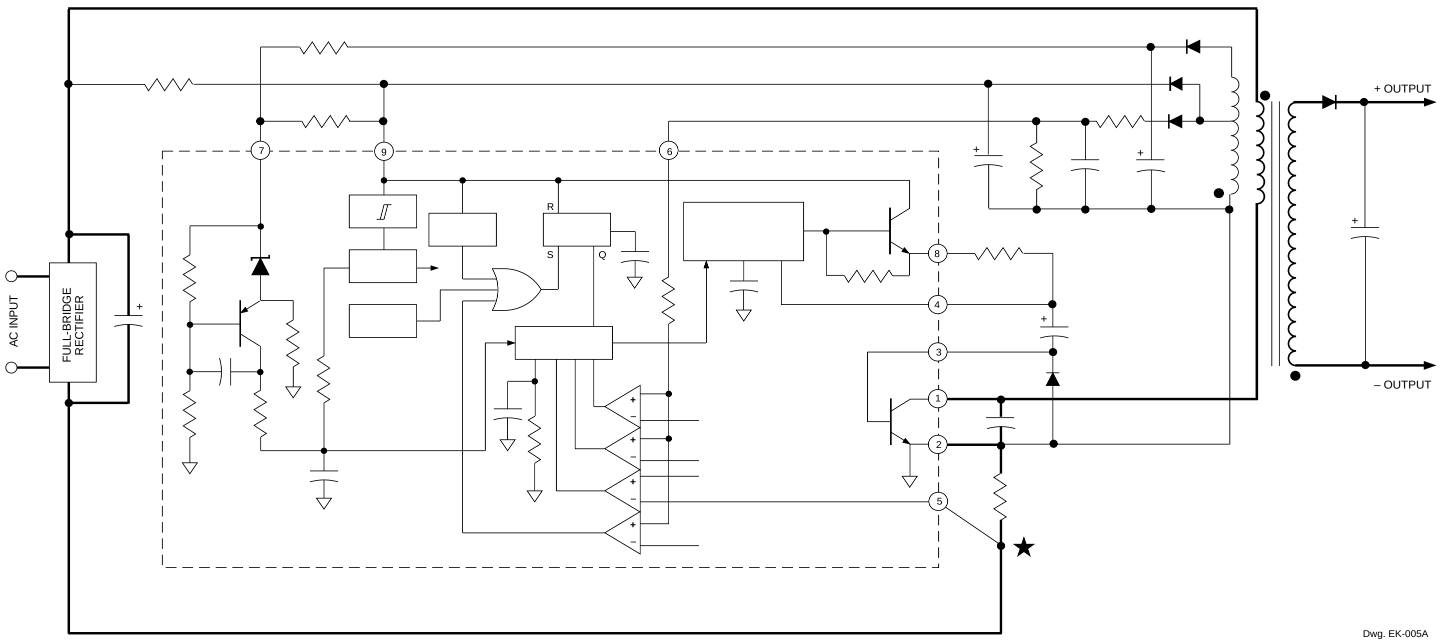
Dwg. GK-001-1

115 Northeast Cutoff, Box 15036
Worcester, Massachusetts 01615-0036 (508) 853-5000

STR-S5703
QUASI-RESONANT FLYBACK OFF-LINE SWITCHING REGULATOR

TYPICAL QUASI-RESONANT FLYBACK CONVERTER

WARNING: lethal potentials are present. See below.



APPLICATIONS INFORMATION

WARNING — These devices are designed to be operated at lethal voltages and energy levels. Circuit designs that embody these components must conform with applicable safety requirements. Precautions must be taken to prevent accidental contact with power-line potentials. Do not connect grounded test equipment.

The use of an isolation transformer is recommended during circuit development and breadboarding.

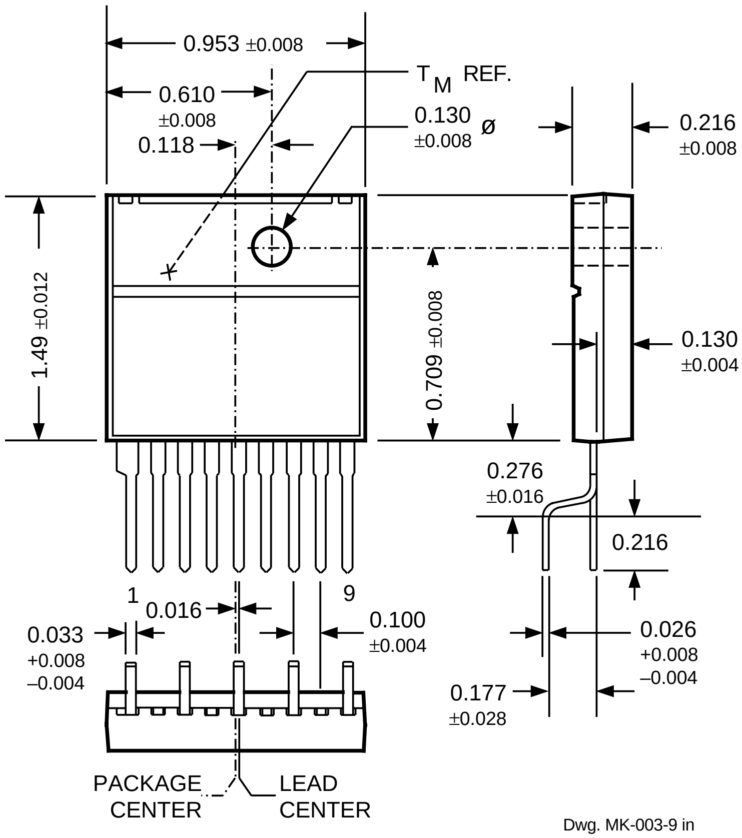
Recommended mounting hardware torque:

4.34 – 5.79 lbf•ft (6 – 8 kg•cm or 0.588 – 0.784 Nm).

Recommended metal-oxide-filled, alkyl-degenerated oil base, silicone grease:

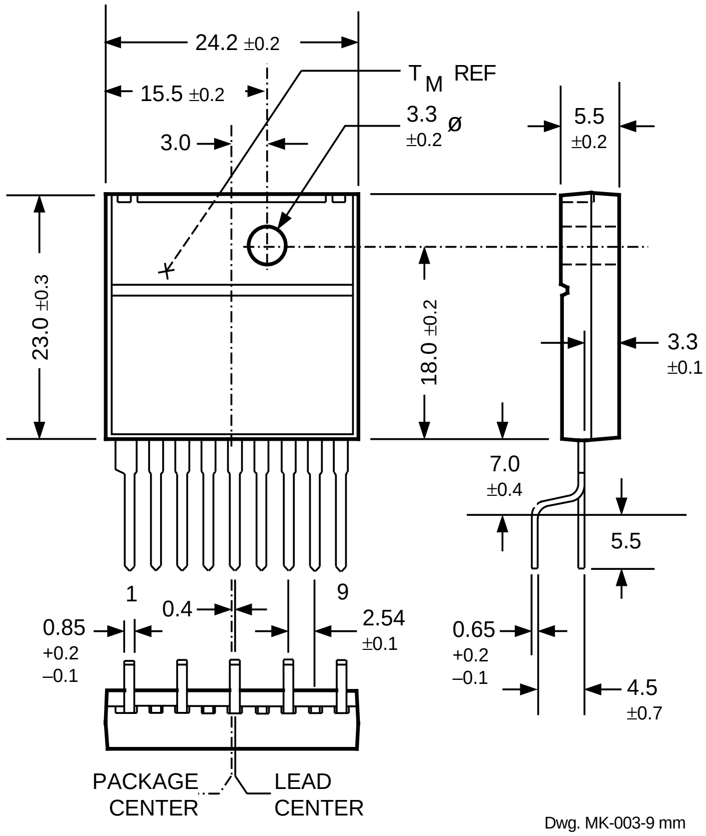
Dow Corning 340, or equivalent

Dimensions in Inches
(Based on 1 mm = 0.03937")



NOTE: Exact body and lead configuration at vendor's option within limits shown.

Dimensions in Millimeters



NOTE: Exact body and lead configuration at vendor's option within limits shown.

POWER CONVERSION/POWER MANAGEMENT SELECTION GUIDES

SWITCHING REGULATOR PMCMs

Part Number*	Application	AC In	Max P_O	Power Switch		
5703	Quasi-Resonant Flyback Converter	110/120 V	140 W	500 V	6 A	Bipolar
5707	Quasi-Resonant Flyback Convertter	85-265 V 220/240V	90 W 140 W	850 V	6 A	Bipolar
5708	Quasi-Resonant Flyback Converter	85-265 V 220/240 V	120 W 180 W	850 V	7.5 A	Bipolar
6511	Quasi-Resonant Flyback Converter	110/120 V	180 W	450 V	11 A	MOSFET
6525	Quasi-Resonant Flyback Converter	85-265 V	120 W	600 V	6 A	MOSFET
6529	Quasi-Resonant Flyback Converter	220/240 V	180 W	800 V	5.4 A	MOSFET
6703	Quasi-Resonant Flyback Converter	110/120V	140 W	500 V	6 A	Bipolar
6704	Quasi-Resonant Flyback Converter	110/120 V	100 W	500 V	5 A	Bipolar
6707	Quasi-Resonant Flyback converter	85-265 V 220/240 V	90 W 140 W	850 V	6 A	Bipolar
6708	Quasi-Resonant Flyback Converter	85-265 V 220/240 V	120 W 180 W	850 V	7.5 A	Bipolar
6709	Quasi-Resonant Flyback Converter	85-265 V 220/240 V	160 W 220 W	850 W	10 A	Bipolar

* Complete part number includes additional characters to indicate operating temperature range and package style.

LINEAR REGULATOR ICs

Part Number*	V_O	Max DC In	Max Dropout	Max I_O	Package
8184	3.0 V	10 V	300 mV @ 125 mA	250 mA	SOT-89
8187	3.3 V	10 V	300 mV @ 125 mA	250 mA	SOT-89

* Complete part number includes additional characters to indicate operating temperature range and package style.

Also — 83145 and 84145 Latched, Universal Input-Voltage Switches.